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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,423	10/24/2005	Peter Andrin	DC8507 US PCT 1	3310

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Thomas W Gorman
E I Du Pont De Nemours and Company
Legal Patent Records Center
4417 Lancaster Pike
Wilmington, DE 19805

EXAMINER

LAIOS, MARIA J

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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01/27/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,423	Applicant(s) ANDRIN ET AL.	
	Examiner MARIA J. LAIOS	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4 and 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment filed 3 November 2008. Claims 1 and 2 have been amended, claim 3 and 22-24 have been cancelled and claims 5-11 were previously cancelled. Currently claims 1, 2, 4 are 12-21 currently pending and finally rejected as necessitated by amendment.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

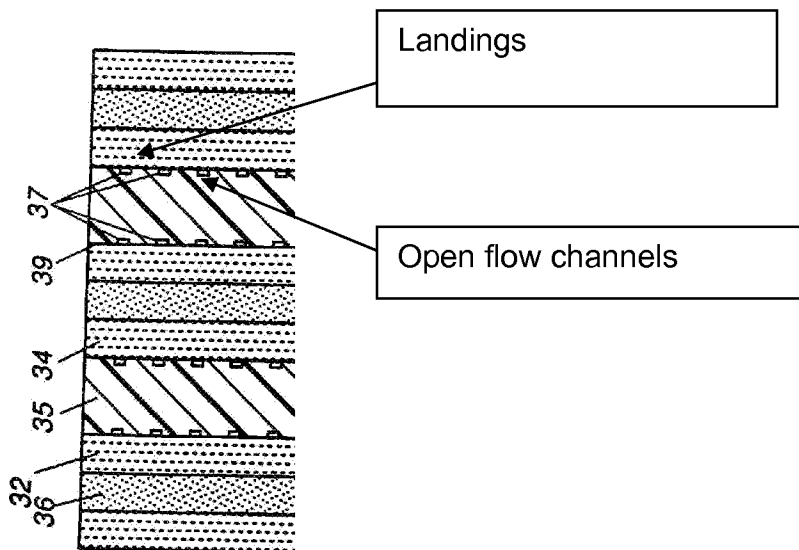
3. Claims 1, 2, 4, 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (GB 2 326 017 A) in view of Sugita et al. (US 6,455,179 B1).

With respect to claim to claim 1, 2, 4, 14 and 20-21, Davis discloses an electrochemical cell (fuel cell, as applied to claims 20, multiple cells are disclosed in figure 3, as applied to claim 21) comprising electrodes (32 and 34) with an electroconductive separator plate comprising at least one landing surface formed on a surface of the electroconductive separator plate, and the electroconductive separator plate and land surface comprising a thermoplastic polymer (page 5 lines 9 discloses the thermal plastic as polyamides as applied to claim 4) and a conductive filler (Page 4 lines 33, carbon fiber or carbon powder, as applied to claim 14) wherein the first surface of the gas diffusion layer is joined to the separator plate by localized impregnation of some

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of the thermoplastic polymer on the landing surface with in the pores of the porous body so the electrical contact between the filler and the electrode is maintained (Page 6 lines 6-8, as the bipolar plate becomes heated it will fuse with in the porous electrode. Since the thermoplastic polymer on the landing surface is impregnated into the porous body of the electrode the plurality of welds are spaced along the surface of the porous body. Because the welds are formed on the landings the welds are formed in between the channels.

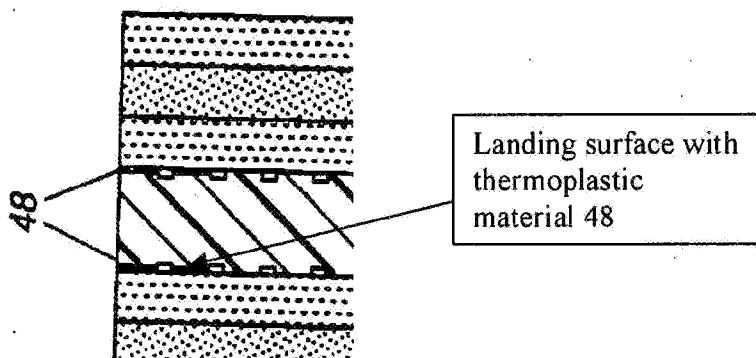
Davis discloses the separator plate comprising landing surfaces separated by open flow field channels (see figure below) and discloses applying heat to fuse to the anode and cathode (Page 6 lines 5-7). Davis fails to explicitly disclose that the porous electrode has a discrete gas diffusion layer.



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Sugita et al. discloses a fuel cell and teaches the electrodes (40, 42) are abutted to the gas diffusion layers (44, 46) which are abutted to the separator plate (34, 36) in order for the gases to diffuse through the layers. It would have been obvious for one of ordinary skill to include a gas diffusion layer of Sugita et al. to the porous electrode of Davis because this ensures an efficient entry passage for the gases.

With regard to claim 15-17, Davis discloses a thermoplastic bipolar with a thin layer of thermoplastic material/polymer rich material (48, polyethylene or polypropylene) on top of the landing surface (Figure 4, shown below). Since the thermoplastic material is disclosed as polyethylene or polypropylene it is polymer rich at 100 weight percent polymer.



With respect to claim 18, the electrochemical cell component of Davis inherently has a resistivity less than a resistivity of a system comprising a gas diffusion layer that is not welded to the separator.

With respect to claim 19, Davis discloses fusing the bipolar plate to the MEA which would indicate that the gas diffusion layer does not sink into the open flow field channels of the separator plate (Page 6 lines 5-10).

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4. Claims 12 and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (GB 2 326 017 A) in view of Sugita et al. (US 6,455,179 B1) as applied to claim 1 above, and further in view of Takagi et al. (US 7,008,991 B2).

Davis discloses the component as discussed above and incorporated herein but fails to disclose a blend of 1 to 30 or 5 to 25 weight percent of maleic anhydride modified polymer with a liquid crystalline polymer and fluorinated polymer.

Takagi et al. discloses a thermoplastic resin composition with a composition of Component A, which is a thermoplastic resin such as styrene-maleic anhydride copolymer (col. 2 lines 26 and 27, styrene-maleic anhydride copolymer (col. 3 lines 14-36), Component B is a liquid crystal thermoplastic (col. 2 lines 46-47, col. 6 lines 23-26) and Components C and D are conductive carbon black (col. 8 lines 12-17) which can be molded for materials that require conductivity (col. 10 lines 43-46). The amount of component A with respect to component B affects the mechanical strength and moldability (col. 9 lines 7-27). The amount of component A is 5-65 parts by weight and component B is 95 to 35 parts in 100 parts by weight of the two thermoplastic resins combined (col. 9 lines 15-20). Takagi does not disclose the specific range of 1-30 weight percent.

Davis and Takagi are analogous art because both are from the same problem solving area of using a molded resin compound for electrical conduction. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the polymer composition of Takagi in the fuel cell separator of Davis because the polymer compound of Takagi is suitable for molded components requiring excellent

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conductivity and strength. See MPEP 2144.07. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). The use of the resin for bipolar plate is a case of prima facie obviousness. *In re Sinclair*, 325 U.S. 327, 65 USPQ 297 (1945).

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the percentages of the two thermoplastic components (maleic anhydride polymer and liquid crystalline polymer) of Takagi through routine experimentation as the weight ratios affect mechanical strength and moldability. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). The use of the resin for bipolar plate is a case of prima facie obviousness. *In re Sinclair*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

5. Applicant's arguments filed 3 November 2008 have been fully considered but they are not persuasive.

Applicant's main arguments include the following:

- a. Davis does not disclose a gas diffusion layer with welds that are spaced apart.
- b. Heat lamination of Davis is applied to the entire surface of the separator thus completely adhering it to the MEA.
- c. The heat lamination forms an insulative adhesive polymer layer.

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d. Sugita discloses the stack is integrally tightened using a spring mechanism and not by the welds.

In response to these arguments:

a. Davis discloses the electrode as a porous member but fails to disclose a separate GDL. To address this deficiency in Davis, Sugita is used to teach that a GDL can be used with an electrode to ensure efficient distribution of gases.

b. The heat lamination would laminate the lands of the separator plate with the GDL thus only the contacted area would be laminated.

c. Since the bipolar plate of Davis is a conductive polymer (Page 4 lines 31-Page 5 lines 1-3) it is unclear why this would lead to insulative layer.

d. Sugita reference is used to teach a GDL and not the welds which are taught by Davis.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA J. LAIOS whose telephone number is (571)272-9808. The examiner can normally be reached on Monday - Thursday 10 am -7 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./

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Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795